World Population Trends and Challenges

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For much of the last half century, public discussion of population issues has focused on the proposition that the world faced a population explosion. Many predicted dire consequences as population growth rapidly used up supplies of exhaustible resources such as metals and petroleum. The standard of living would decline as certain essential resources became ever more scarce and costly.

This pessimistic view was not new. In 1798, Thomas Malthus, in his famous "Essay on the Principle of Population," argued as follows:

> The power of population is indefinitely greater than the power in the earth to produce subsistence for man. Population, when unchecked, increases in a geometrical ratio. Subsistence increases only in an arithmetical ratio. A slight acquaintance with numbers will show the immensity of the first power in comparison of the second.

Thus, in Malthus's view, population growth will inevitably outstrip the earth's capacity to produce food, resulting in widespread famine, disease, and poverty.

Modern concern over population growth shares with Malthus the view that population pressures will have dire consequences. However, the Malthus view that these consequences are inevitable—the view that earned economics the label "dismal science"—is not shared by informed observers today. For some, advocacy of rigorous methods of population control has replaced resigned pessimism. For others, a worldwide decline in the birth rate seems to be solving the problem without further government action.

If you ask people whether we must continue to be concerned about a population explosion, I'll bet that nine out of ten will respond that the problem will become extremely important in coming years. Yet, experts who study these issues say that the odds that population growth will cause real difficulty in the foreseeable future have receded. They emphasize instead that we face another population problem that will be at hand very soon—a rapidly aging population. Indeed, we will soon face *with certainty* problems from an aging population. Today's college students, early in their working careers, will be confronted with this issue.

Because so few seem aware that the immediate demographic problem is that of a graying population rather than an exploding one, I've chosen to focus on aging in this lecture. However, I'll begin by discussing population projections to set the stage for discussing issues raised by population aging.

Before proceeding, I want to emphasize that the views I express here are mine and do not necessarily reflect official positions of the Federal Reserve System. I thank my colleagues at the Federal Reserve Bank of St. Louis for their comments, especially Dave Wheelock, assistant vice president in the research division, who provided extensive assistance. However, I retain full responsibility for errors.

WORLD POPULATION PROJECTIONS

When Malthus wrote his treatise in 1798, the world's population totaled some 900 million persons. Today, world population is roughly 6.4 billion persons, and about 100 million persons

are added to the total every year. Although we do witness famine, disease, and poverty, as Malthus predicted, these sad events are usually isolated and reflect temporary problems, often created by civil war. Across the world, food is generally more abundant and less expensive, measured in terms of the amount of labor that must be expended to obtain a given level of nutrition, than it has ever been. Agricultural productivity continues to rise rapidly, and it seems unlikely that world food supply will be a constraint on population growth for years to come, if ever.

Still, in light of rapid growth of the world's population, especially over the last 50 years, many people have questioned whether our current population is sustainable. Echoing Malthus, some commentators claim that the continuing population growth will create unsustainable pressures on the world's resources and raise pollution to dangerous levels. Particularly prominent in recent discussions is the threat of global warming from emissions of greenhouse gases.

Let's begin with recent projections of world population growth from the United Nations. A notable development is the changing distribution of population between the so-called "developed" and "less developed" nations. Population growth has been much faster in the poorer countries than in those with high standards of living and wealth. Whereas the developed countries of Europe, North America, Australia, and New Zealand accounted for roughly one-third of world population in 1900, and about the same percentage in 1950, by 2000, those countries accounted for just 20 percent of world population. It seems likely, however, that the population growth of many lesser-developed countries will slow during the present century, as I will discuss in the second part of my talk.

World population has more than doubled in the last 50 years, and has nearly quadrupled since 1900. Currently, world population is growing at a rate of 1.35 percent per year. The United Nations' most recent forecast, however, predicts a slowing in the growth of world population to about 0.33 percent per year by 2050, at which time forecasters are predicting that world population will total 8.9 billion persons.

Interestingly, by mid-century, U.N. forecasters predict a world average fertility rate—that is, the average number of children a woman will bear in her lifetime—of 1.85. At that rate, fertility will be below the level necessary for population to stay constant—about 2.1 children per woman. Consequently, world population is expected to begin declining sometime toward the end of this century.

Such projections must always be taken with a grain of salt because they are based on a number of assumptions that may not turn out to hold. In the early 1930s, U.S. government forecasters predicted that at the end of the 20th century our nation's population would total 145 to 150 million persons. The forecasters didn't count on the baby boom that came along after World War II, however, and their forecast turned out to be far too low. By 2000, U.S. population had reached nearly 300 million, or twice the level in the forecast made 70 years earlier.

I've already noted that population growth during the last 50 years or so has been far higher in relatively poor countries than in higher income countries. Much of the increase in world population projected for the next 50 years is also forecast to occur in lesser-developed countries (LDCs). Whereas LDCs have a total population of 5.1 billion today, those countries are projected to have 7.7 billion persons and a population growth rate of 0.40 percent in 2050. By contrast, many developed countries are projected to have falling populations by 2050.

On the surface, the disparate population growth rates of the developed and developing worlds may seem cause for alarm. Indeed, rapid population growth, at least in the short run, implies that poverty levels will rise unless supplies of food, shelter, and other scarce resources increase as rapidly. In many developing countries, employment growth lags the growth rate of the working age population, leading to *falling* wages, unrest, and emigration.

However, if we look at the reasons for the disparate growth rates of population between the developed and developing world in the 20th

century, there are reasons to be more optimistic about the future. For centuries, the world's population grew slowly, as high rates of mortality largely offset high birth rates. Wars, famines, and epidemic diseases caused many people to die young, and average life expectancy was consequently low. In Europe, conditions began to improve by the 17th and 18th centuries, with increased food supplies and improvements in personal hygiene and public sanitation. By the 19th and early 20th centuries, most European and North American countries had experienced a "demographic transition" from high rates of fertility and mortality to low rates.

In most countries, the demographic transition is seen first in a declining mortality rate. Because the birth rate initially remains high, population growth increases sharply. As the transition proceeds, however, the birth rate declines to approximate the lower mortality rate. Population growth then slows. Most economically developed countries have completed this transition, but LDCs are at the intermediate stage of low mortality, but still high fertility rates. Consequently, their population growth is rapid.

The data indicate, however, that fertility rates have declined substantially during the last 20 to 30 years in many LDCs. From 1970 to 2000, the median fertility rate among LDCs declined from 5.9 children per woman to 3.9 children per woman. If these trends continue, then population growth will slow. If fertility rates do not change from current levels, however, the U.N. projects that the world's population will be 12.8 billion persons in 2050, instead of the 8.9 billion it forecasts as most likely.

Indeed, the U.N. projects that the average fertility rate among LDCs will fall below the replacement rate by 2050. Thus, toward the end of the century, population in those countries is likely to begin to decline. Some 20 nations classified as lesser developed *already* have fertility rates below replacement level, as do some 39 other nations. Several LDCs continue to have high fertility rates, however, and these include many of the world's poorest nations.

Fertility rates have also declined in many developed countries, including some where fertility rates were already low in 1970. In 2000, only four developed countries—Albania, Iceland, New Zealand, and the United States—reported fertility rates at or above 2 children per woman. With the exception of the United States, these are all small countries.

The fertility rate is below 2 in most developed countries, and in many cases substantially below. Some representative examples are the United Kingdom, 1.6, Germany, 1.4, Italy, 1.2, and Japan 1.3. The fertility rate in the United States is 2.1.

The United Nations attributes the substantial decline in fertility throughout most of the world to increased use of contraception, especially in LDCs, and to an increase in the average age at which women bear their first child, which has been more pronounced in developed countries. By the 1990s, the median age at first birth was 26.4 years in developed countries and 22.1 years in developing countries.

A GRAYING POPULATION

A decline in the birth rate obviously means that population growth will slow. But no fancy calculations are required to understand that a sharp decline in the birth rate will also create an imbalance in a population; the decline in the number of young people inevitably means that the proportion of older people in the population will rise.

While the world's population growth has slowed, there has, therefore, also been an aging of the population. A good summary measure of a population's age is the median age—the age such that half the population is older and half is younger. Over the last half century, the median age of the world's population has increased by 2.8 years, from 23.6 in 1950 to 26.4 in 2000. The U.N. forecasts median age to rise to 36.8 years in 2050. More-developed countries are expected to have an increase in median age from 37.3 years to 45.2 years, and lesser developed countries from 24.1 years to 35.7 years. Japan is today the country with the oldest population, having a median age of 41.3 years. Japan is projected to

have a median age of 53.2 years in 2050. The median age of the U.S. population, by contrast, is currently 35.2 years, and is forecast to be 39.7 years in 2050.

The world's fastest growing age group is comprised of those persons 80 years and older. In 2000, 69 million persons, or 1.1 percent of world population, were aged 80 or older. By 2050, the number aged 80 or older is expected to more than quintuple to 377 million and be 4.2 percent of world population. In that year, 21 countries or areas are projected to have at least 10 percent of their population aged 80 or over. Indeed, Japan is forecast to have almost 1 percent of its population comprised of persons aged 100 or more. The United States is projected to have 7.2 percent of its population made up of those 80 and older.

To understand the implications of the graying population, think about a family living on the U.S. frontier 150 years ago. The family was largely self-sufficient, growing its own food, making its own candles, and building its own house with some assistance from neighbors. The working members of the family had to grow the food for the entire family, including children and elderly grandparents. The children went to work at a young age, and the grandparents worked in the fields as long as they could. The larger the number of children too young to work and the larger the number of disabled elderly, the greater the burden on those in their prime working years. The children and the elderly were dependents, supported by those working.

The fact that we live in a high-income industrial society does not change the fact that those working have to produce all the goods and services consumed by the entire population. Nonworking dependents are dependents just as surely today as they were on the frontier 150 years ago. Those of you soon to be in the working population will have to support yourselves and the dependent population of children and elderly.

In frontier America, the elderly did not retire to Florida on their Social Security and other pensions. They in fact worked as long as they were able to work. They might not be able to do heavy work in the fields but they could do less physically demanding work, and they did. The truly dependent were those who were bedridden, and with the medical technology available in those days they usually did not live very long in such a condition.

The United States and other high-income countries have pension systems, such as our Social Security system, to support the elderly. But the Social Security system sets the retirement date by the calendar and not by capacity to work. Thus, today many and perhaps most retire while physically able to work productively.

This "graying" of the population poses a serious fiscal problem as the dependency ratio—the ratio of persons out of the labor force to the number of persons in the labor force—rises. Government pension systems—Social Security in the United States—is where a rising dependency ratio has its most obvious impact. Social Security, like the public systems of most countries, is a "pay-as-you go" system, meaning that today's benefit payments to retired persons are funded by current taxes on working persons. Obviously, as the number of those receiving benefits rises relative to the number paying taxes, the average taxpayer must shoulder a larger and larger burden or, alternatively, benefits must be cut.

One way to think about Social Security taxes today is that they are like the food grown by the frontier farmer and his wife that they do not get to consume because the food goes to their parents and children—their dependents. Some of the income earned by those working today has to be diverted to provide benefits for retired dependents. The burden will rise substantially in coming years because the number of retirees will rise relative to those at work.

There has been some careful work on this subject by the Organisation for Economic Cooperation and Development (OECD), an organization comprised of economically advanced democratic countries, including the United States. OECD projections indicate that public transfers to retired persons for pensions and health care will increase in the average OECD country by 6 percent of GDP, from 21 percent to 27 percent, between now and 2050. Unless promised future

benefits are cut significantly, substantial tax increases will be necessary to effect such transfers. However, as a recent OECD report concludes, drastic tax increases could make matters worse by reducing the incentives for market work and for saving.[1] Indeed, the OECD concludes that in many countries it may be necessary both to reduce promised benefits and to increase the incentives for work.

In recent decades there has been a tendency for people to enter the labor force at a higher age while retiring at an earlier age. Consequently, the proportion of life spent working has declined. This phenomenon reflects a number of factors, including increasing returns to education and increasingly generous transfer programs that encourage early retirement. In countries that experienced a post-World War II baby boom, large increases in the labor force in the 1960s and 1970s reduced the dependency ratio and enabled increasingly generous transfer payments to retired persons. However, if life expectancy continues to increase, as demographers project, the dependency ratio will rise and such transfers will constitute an increasing burden on those working.

It is worth emphasizing that as important as it is to put the Social Security and Medicare trust funds on a sound financial basis, doing so does not necessarily solve the problem created by a high dependency ratio. We can understand this point easily by supposing that the Social Security trust fund already held enough U.S. government bonds to cover large benefit payments in coming years. When the trust fund sold bonds to provide funds to make benefit payments, who would buy the bonds? The elderly wouldn't be buying the bonds—they are the ones who need the benefit checks to pay for everyday living expenses. The working generation would have to buy the bonds—interest rates would have to be high enough to persuade enough members of the working generation to buy bonds. Their purchases would provide the cash the Social Security System would need to pay benefits to the retired generation. In short, somebody has to give up consumption so that those who are retired can have the consumption goods instead.

This discussion should make clear that the fundamental problem our society—and all aging societies—face is not fundamentally a financial problem but instead a problem of an excessive number of retired people relative to working people. This is a problem we can solve, and it is really a happy problem in many ways. We are living longer and in much better health—that can't be a problem!

Nevertheless, an implication of living longer should not be that younger people have to bear the entire burden of providing goods retirees will consume for those additional years. Would I ask my own children, who have their own problems of supporting themselves and their families, to support me so I can enjoy a life of retired leisure of many years of travel and sailing, which are two of my passions? I wouldn't do that looking my own children in the eye, and I don't think we as a society should collectively ask the younger generation to support all the additional years of retirement of the baby boom generation that modern medicine makes possible.

Unless those in my generation and the baby-boom generation want to place a huge burden on our children and grandchildren, we need to adopt some combination of the only two possible solutions. One is to reduce the annual payments to Social Security beneficiaries, and the other is to reduce the number of retirement years by raising the retirement age. These changes—whatever mix the country decides it prefers—should be phased in gradually, to avoid an undue impact on those who are close to retirement today. My own preference is to concentrate on raising the retirement age for full benefits, given that people are healthy and productive much longer than they used to be.

Rather than moving toward a later retirement age, the public pension systems of many countries today actually encourage early retirement by offering generous benefit payments to early retirees. Although early retirees typically receive

[1] OECD. "Strengthening Growth and Public Finances in an Era of Demographic Change." May 2004.

a smaller annual pension than persons who wait until they are older to retire, the difference in many countries is insufficient to discourage large numbers of people from retiring early. The United States is something of an exception. For a man with average income, our Social Security System is roughly neutral between ages 62 and 67. Beyond that age, however, the incentive to remain in the labor force is low. Put another way, the implicit tax of remaining in the labor force—foregone benefits—is relatively high. At a technical design level, there are a number of possible ways to create a more neutral system with respect to retirement age, so that at a minimum those who want to work longer are not penalized for doing so. The idea is that annual benefits need to be higher by an actuarially fair amount when retirement is delayed.

A recent OECD study found a close correlation between incentives to retire and retirement behavior—not surprisingly, people do respond to incentives! The implication of this research, according to its authors, is that labor force participation in the 55-to-64 age group would be increased substantially by reforms that abolished policy-induced incentives to retire early. Indeed, the report goes on to suggest that policymakers should consider skewing incentives *against* retirement, at least up to some age, in recognition that people who work provide a net positive impact on public budgets.[2] By continuing to work past normal retirement age, people support themselves and pay taxes that help to reduce the tax burden that would otherwise fall on others.

Several countries have begun to rein in their public pension systems by instituting reforms that reduce incentives to retire early or by raising the age at which persons are eligible for benefits. The United States, for example, has in place a gradual increase in the retirement age for full Social Security benefits from age 65 to age 67 by 2025. Our Social Security system was begun in the 1930s when the average 65-year-old person could expect to live about an additional 13 years; by 2000, those additional years at age 65 had risen to about 18. It makes sense that we lift the age of eligibility for Social Security payments in recognition of the increase in our expected life spans. However, it is clear that the increase in normal retirement age from 65 to 67 that is in current law does not go far enough to solve the problem.

The OECD has recommended a number of other reforms to its member countries to encourage older persons to remain active participants in the labor force. These include removing labor market rigidities that discourage part-time employment and implementing reforms that would increase the share of retirement income from private sources relative to public pay-as-you-go systems. Such policy reforms could help alleviate the fiscal challenges posed by aging populations both by lowering dependency ratios and by favoring economic growth.

CONCLUSION

Demographic change in the United States and elsewhere in the world presents enormous challenges. In much of the world, the combination of increased life expectancy and a reduced birth rate has created a situation in which the population is becoming unbalanced in its age distribution. We know this problem is right ahead of us, because the people have already been born. I hope I have convinced you that Social Security and Medicare are not just problems you will have to deal with when you come close to retirement age, but problems you will have to address within a few years. Taxes to support these retirement programs will fall on you, and not on those already retired. Retirees will face the possibility of benefit cuts, to be sure, but you will face the problem of tax increases. We are truly all in this situation together, and we had better find a way to deal with it together.

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[2] This research is summarized in "Strengthening Growth and Public Finances in an Era of Demographic Change." OECD, May 2004.